

THE DOMAIN OF ETHNOBIOLOGY¹

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SCATTERED data bearing on the utilization of plant and animal life by primitive peoples in the New World have been accumulating ever since the first voyage of Columbus, but the first attempt to present a systematic statement of the subject appears to be that of Palmer (1870), who published a paper, the content of which was enlarged in a second treatise (Palmer, 1878).

As early as 1875, Powers (1873-74) made an attempt to delimit the field when, in an article entitled "Aboriginal Botany," he employed the term to embrace "all the forms of the vegetable world which the aborigines used for medicine, food, textile fabrics, ornaments, etc." These papers by Palmer and Powers stimulated a considerable amount of interest, as indicated by the appearance of a succession of papers by such men as Powers (1877), Matthews (1882, 1886), Havard (1884, 1895, 1896), Newberry (1887), Coville (1892, 1897), Bourke (1895), Fewkes (1896), Hough (1897, 1898), Barrows (1900), Jenks (1900), Chestnut (1902) and Cushing (1920). Two additional factors contributed materially toward the creation of a deep interest in the aboriginal utilization of plant and animal products. The first was the botanical surveys made in the western United States by representatives of the Federal Government, which brought men into contact with primitive peoples and their methods of exploiting local flora and fauna. The second factor was an exhibit at the World's Fair in 1893 of archeological specimens, such as objects of food, dress, household utensils, etc., from Mancos Canyon, Colorado. At the close of the fair, the University of Pennsylvania secured the loan of this collection.

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The Mancos Canyon collection was studied by Harshberger, of the department of botany at the University of Pennsylvania, who described the objects of vegetable origin; and on the basis of this he delivered a lecture before the University Archaeological Society in 1895, publishing the lecture in the following year (Harshberger, 1896). This apparently represents the earliest application of the term "ethnobotany," which now has come into universal use in America. Schieman (1932) has summarized some of the related ethnobiological material for the Old World, but neither the term ethnobotany nor any cognate term appears to have been employed in the eastern hemisphere. Although Harshberger indicated several directions in which ethnobotany could be of service, he made no specific attempt to define the term, evidently visualizing it in this and other papers as merely the use of plants by aboriginal peoples. About fifteen years after the publication of Harshberger's first paper, Robbins *et al.* (1916) expanded this concept, pointing out that ethnobotany consisted of far more than collecting, identifying and ascertaining the uses of plants by primitive peoples; that it must strike more deeply into the thought and life of the peoples studied, gaining from them their impressions of total environment involving such matters as primitive concepts of plant life; the effect of a given plant environment on the lives, customs, thoughts and everyday practical affairs of the people studied; and the extent of a people's knowledge of plant parts, functions and activities.

Specific studies on the aboriginal utilization of animal life have been less numerous than those on the plant side, and the data relating to the former have not been so well assembled and organized as have those on plants. Henderson and Harrington (1914) published a paper in which they employed the term ethnozoology as coordinate with the older name ethnobotany. Although this work seems to have stimulated little research into primitive animal utilization as such, a very considerable

body of information bearing on the use of animals by primitive peoples is to be found in a variety of publications, which have not been written as special treatises on ethnozoology as, for example, papers by Merriam (1905, 1926), Steensby (1917), Birket-Smith (1929, 1936), Allen (1876) and Hornaday (1889).

For many years, ethnobiological information has been gathered by men with little or no training in the study of the primitive utilization of plant and animal life, and in a manner only incidental to their major fields of investigation with no thought of pursuing such studies for their own sake. The data of ethnobiology, therefore, are scattered in the publications of a wide variety of fields. More recently, a few scholars have adopted ethnobiology as their principal field of interest, and have devoted sustained attention to such studies; as a result we now have in the New World a few professional ethnobiologists, and the field is rapidly taking on the earmarks of an independent line of inquiry, as indicated, among other things, by the recognition which *Biological Abstracts* has given to it within the last few years.

A very large proportion of the ethnobiological investigation in the western hemisphere has been carried on with no reference whatever to a motivating point of view. In the past, and to some extent at present, many data bearing on the utilization of plant and animal life by primitive peoples have been gathered by anthropologists, who obviously have not had the biological background necessary to identify precisely, or even see any necessity for identifying, the organisms in question. This situation often has rendered their data of little value to the biologists. On the other hand, ethnobiological data have just as frequently been gathered by biologists who, completely lacking anthropological training, have, during the course of their investigations, secured no data relative to the importance of these organisms in tribal economy, their manner of utilization, etc. Their publications, constitut-

ing little more than a technical list of organisms used by a given people, are dry and barren, and are almost entirely without significance to any one but the botanist.

In view of the above situation, the ethnobiologist is constantly confronted with the problem of delimiting his attitude toward his field of investigation, of defining his point of view or "center of gravity." This, in addition to the rapid progress made in ethnobiology during the last decade, and the recent emergence of the subject as a rather distinct field of inquiry, have motivated several investigators to attempt to circumscribe and define the field of ethnobiology, more particularly ethnobotany.

Vestal and Schultes (1939) have employed the term *economic botany* "to include all plants or plant products of use to man," stating that, in this sense, economic botany is more inclusive than ethnobotany, "a term by which most investigators have designated the plants used by aboriginal peoples." They have adopted what they regard as the broader term, economic botany, "because not all the uses of plants by primitive people are of necessity aboriginal in origin." More recently, Schultes (1941) has reiterated this point of view, stating that the men of science of one or another school are agreeing rather unanimously to regard ethnobotany as "the study of the relations which exist between man and his ambient vegetation." It would seem, however, that Schultes has stated a situation which does not exist in fact, for there is by no means universal agreement with the point of view as set forth by Vestal and Schultes. Economic botany, to be sure, does at times inquire into the relations between primitive man and plants, but rarely does it do so because of any interest in such primitive relationships for their own sake. The major interest of economic botany is in the relationships between plants and modern or contemporary civilizations, and its only interest in primitive relationships consists in the illumination which they may throw upon the modern scene. Ethnobotany, on the other hand, is concerned primarily with the interrelationships

between *primitive* man and plants. Moreover, ethnobotany is sharply differentiated from economic botany in that it is vitally concerned with the fundamental *cultural* aspects of plant utilization, while economic botany practically ignores the cultural except in a very general way. One need only to consult any text-book or reference book on economic botany to realize that its major interest consists in treating the importance of plants and the nature of plant products in relation to modern man; in exploring the uses to which plants are put as, for example, foods, oils, waxes, fibers, rubbers, resins, etc., including the study of the morphology of plant parts which produce such structures. Therefore, ethnobiology is to be looked upon as a field of investigation which exists in its own right rather than as a branch of economic botany.

Recently Jones (1941) published an excellent article entitled "The Nature and Status of Ethnobotany" which is noteworthy for two definite contributions; (1) clearly defining and delimiting ethnobotany; (2) indicating how ethnobotany touches related disciplines and discussing the problems which have arisen from such contacts. He defines ethnobotany as "the study of the interrelations of primitive man and plants," and emphasizes that it deals exclusively with the interrelations of *primitive* man and plants and "takes for its sole aim the illumination of this contact." The author fully endorses Jones's definition, which, in addition to circumscribing the field of ethnobotany, inherently demarcates it from economic botany.

Neither Jones's paper nor any other purporting to define ethnobotany has presented a point which seems vital in delimiting the field. This is the question as to what shall be the point of view, the "center of gravity," of ethnobotanists toward the subject-matter of their own field. Ethnobiology² has many facets and abuts on a number of disciplines, but for the most part it may best be

² From this point on the discussion will bear on ethnobiology rather than on ethnobotany, for the comments apply equally well to both plant and animal life.

regarded as marginal to, or as straddling, both biological science and anthropology. It utilizes the data and the methods of both fields. The question therefore naturally arises as to whether this "center of gravity" shall be biological or cultural or a combination of the two. The author does not look upon ethnobiology as a distinct science and discipline, but rather as a sphere of investigation in which scholars, trained in both biology and anthropology, can render a service to the two fields which neither biologist nor anthropologist as such would be competent to contribute.

There exist certain purely biological aspects to ethnobiology, such as the identification of organisms and their parts as employed by primitive peoples. Often, as in the identification of plant and animal archeological specimens, the situation calls for special and ingenious techniques, sometimes highly refined. Despite the biological aspects of this problem, which involves a knowledge of such things as plant and animal anatomy and geographical distribution of organisms, an anthropological background also is very useful in making such specific determinations of ethnographic or archeologic specimens. Thus, knowledge of the people among whom a particular specimen was collected, the physiography of their range, their food habits, relations with other peoples, etc., are of considerable aid in identification, even if they consist only in eliminating certain organisms from consideration.

When the average person knows that a specific plant or animal was used by a given primitive people, he is by no means content to stop there. It is a thoroughly human quality to inquire what the organism was used for, precisely how it was utilized, the antiquity of its utilization and what the people who employed it were like. When a plant is seen growing in nature, knowing its name may go a long way, if not the entire way, toward satisfying the average person's interest in it. But when it is found in association with coal, a peat bog, an archeological ruin, a Papago storehouse or poisoning fish, it assumes an

entirely new significance. What the botanist has to say about a plant no more exhausts what there is to be said about it than his description of a flower represents all there is to be said about that very interesting plant structure. But just as soon as one begins to answer the questions posed above, he is getting over into the anthropological, the cultural. The availability of a specific food may even determine modes of Indian settlement. Thus Papago families moved annually to the nearest available giant cactus forest to live on saguaro fruit for a period of several weeks when this fruit was ripening. Similarly, Lowie (1940) has pointed out that mode of settlement in the Great Basin area hinged on the supply of piñon nuts. Since a good crop was too large for transportation winters had to be spent near the storage places. In the same manner, Spier (1930) has pointed out that the Klamath Indians in Oregon customarily left their winter villages in April or May to catch fish, gather camas root, etc., and did not return until the snow fell.

Despite the many biological aspects of agriculture, a study of the *origin* of agriculture is much more of a cultural than a biological problem. The biologist's contribution regarding knowledge of the plants used in ancient agriculture leaves a great deal unsaid about primitive cultivation. A study of early Pueblo agriculture, for example, reveals that its crops and techniques simply can not be investigated apart from their ceremonial aspects. The two are wholly inseparable. The real history of agriculture must be economic and social and must have much to say about the "human soil," the social and economic conditions out of which agriculture grew. The first steps in the initial development of agriculture must have been economic and social, rather than botanical. As regards the cultivation of maize in the American Southwest, in ancient times both flour and flint varieties were grown. To the average observer, it would make little if any difference as to which type a certain people grew. The genetical and botanical differences between flour and

flint maize are quite small, for the change from flint to flour corn is controlled by a single gene difference, but the cultural differences associated with the two are great. Primitive Indian groups in the Southwest ground their corn to meal with metate and mano. Even the grinding of flour corn was a slow, laborious process, but the labor involved in grinding flint corn would have been increased many fold. Hence a people limited to the growing of flint corn, for whatever reason, might utilize the crop in ways other than first grinding it to make flour. The type of practice necessarily influenced not only economic but social life, for if a woman had to spend four hours a day grinding flint corn while she could secure the same amount of meal by grinding flour corn only two hours a day, this necessitated a redistribution of her time and thereby had an effect upon the life of the whole family.

In connection with this cultural point of view, it is worthwhile to point out that this subject is also of considerable interest to the geographer. There exists in some quarters a common opinion that, if one knows the geography of a people's habitat, he can state just what wild plants and animals this people used for food, etc. While it is true, in a broad sense, that the material controls of activities based upon the vegetable and animal worlds lead to broad distinctions in the economies of primitive peoples, amounting to geographic determinism in a degree, culture involves much more than geography. Geography limits culture, but by no means is it its sole determinant. While it is valid that, in general, the utilization of food sources is a rational process, varying with their abundance and availability, there are many exceptions. The satisfaction of subsistence needs by a given people is often very irrational, and arbitrary food habits and preferences, dictated by taste and tradition, do exist. Thus such utilization is frequently determined culturally rather than ecologically. Knowing what available and suitable floral and faunal elements a people do not utilize from their natural environment often is just as significant

as knowing which ones they do employ. For example: There is no logical reason why any available food should have been completely excluded from a people's diet. Yet, some of the Northwest Coast tribes, such as the Kwakiutl on Vancouver Island, would not touch venison, even though deer were abundant in their territory. Spier (1930) has pointed out that the Klamath Indians' leaning toward fish as their staple and their relatively small use of deer, elk, antelope and waterfowl, all of which abound in this territory, are arbitrary and not dictated by geographic conditions; and that their food habits are such primarily because they share the habits of the Columbia-Snake river tribes as a whole. That abundance in itself does not guarantee utilization, or at least extensive utilization, is seen again among the Klamath. In addition to the bountiful supply of game in their territory, these Indians had available in Klamath Marsh, according to Coville (1904), the seeds of about ten thousand acres of wokus or the great yellow water lily (*Nymphaea polysepala*), only a small fraction of which was utilized. Despite this plenitude of food, travelers among the Klamath in the early nineteenth century frequently referred to the fact that in winter these Indians were often on the verge of starvation. This was not due to improvidence. For example, the period during which wokus seed could be harvested lasted only a very few weeks, and the process of seed preparation was slow and tedious. This, coupled with the difficulty of transporting the seeds, rendered it impossible to gather, prepare and store large quantities of wokus. Moreover, it is no easier to undersand why a particular food should be exploited to the wide exclusion of all others, even though abundant, as was the acorn in much of California.

A study of the utilization of specific plants or animals by certain primitive peoples not only shows correlations between culture and terrain, but sometimes furnishes valuable clues to historical circumstances. It may not only throw light on the diffusion of certain plants but on

the histroical diffusion of culture in general. This is nicely illustrated among the Crow Indians of southeastern Montana.

The Blackfoot and the Sarci of the northwestern Plains are the only tribes which share with the Crow the ceremonial planting of tobacco, and this represents the only agricultural effort of these typical bison hunters. Lowie (1920), in discussing the Tobacco Society of the Crow, points out that, as an *organization*, this society is an independent structure, presumably of indigenous growth among the Crow, even though some of its elements have their origin among other tribes. Despite the fact that the elaborate organization of the Crow Tobacco Society is without parallel among the Blackfoot and Sarci, the resemblances between the planting performances of the three tribes suffice to establish ultimate community of origin for the practise. The question naturally arises as to whether the Crow borrowed from the Blackfoot (and the marginal Sarci) or *vice versa*. For the reasons which follow, Lowie concludes that the Crow derived their tobacco agricultural technique from the Hidatsa (living on the upper Missouri), elaborated it ceremonially, and subsequently transmitted it to the Blackfoot, who in turn passed it on to the Sarci together with some of the ceremonial patterns which the Blackfoot themselves evolved: (1) the much more important place which tobacco planting holds among the Crow than among the Blackfoot; (2) the Crow were intimately related to the Hidatsa, who planted tobacco, as well as corn, beans, pumpkins and sunflowers, while the Blackfoot were not in contact with any group from whom they could be expected to have derived the technique; (3) the only Siouan language in which the Crow stem for "tobacco" appears is Hidatsa (*ôpe*). Anthropologists believe there is considerable evidence that the Crow and the Hidatsa were one people not so very long ago, one important consideration being the close similarity of language. Reasons nos. 2 and 3, as presented, shed some light on the

historical diffusion of a cultivated plant, of a culture trait and even of the movement of a people itself; that the Hidatsa share with the Crow a common term for tobacco, as well as an agricultural technique, provides bits of evidence in support of the thesis that these two peoples formerly were one. The fact that the Hidatsa cultivated *Nicotiana quadrivalvis*, in non-ritualistic fashion, while the Crow grew *N. multivalvis*, and only ceremonially, does not vitiate the conclusion that the Crow borrowed their tobacco-growing technique from the Hidatsa and elaborated it ceremonially.

Out of the author's experience in ethnobiology have come certain definite conclusions regarding factors to be kept in mind in carrying on research in this field. These apply particularly to the study of wild plants and animals, although some of them are equally applicable to the investigation of domesticated forms. The student of cultivated plants and animals and of primitive agriculture is advised to consult several of the better treatises on these subjects before undertaking field studies relating to them.

(1) Identification, in exact taxonomic terms, of the plant or animal used. This is less easy with animals than with plants because of the difficulty of obtaining and preserving specimens. In any case, if the investigator is himself not competent to make the exact identifications, he should seek the assistance of specialists.

(2) Relative abundance and availability of the organism.

(3) Indian name for the plant or animal. This often gives an insight into the tribe's conception and knowledge of the structure, function and method of classification of organisms, as well as into related aspects of the people's ceremonial life. Moreover, this name is often of much practical aid in identification when only fragments of the plant or animal are available for study.

(4) The part of the organism utilized by the natives, *i.e.*, root, stem, leaf, flower, seed, etc.

(5) The purpose for which the plant or animal or part thereof is utilized.

(6) The exact manner in which the organism or the part used is prepared.

(7) The season in which the plant or animal is collected by the natives. This contributes toward working out the calendric sequence or annual cycle with respect to economic life.

(8) Whether or not the organism is native to the area inhabited by the people under consideration.

(9) The antiquity of utilization. It is of the utmost importance to ascertain whether or not such employment of a specific organism is aboriginal.

(10) The actual value by modern standards of the plant or animal employed. This applies particularly to the study of plants used medicinally and involves an inquiry into the actual therapeutic value of the plant. Frequently such information is not available in our own *materia medica* and would call for pharmaceutical research, which of course lies outside the purview of the ethnobiologist.

(11) What species of plants and animals in the tribe's environment are not utilized. For example, as indicated above, some tribes ignore major, readily available food sources. Such facts are significant, call for explanation and may illuminate certain cultural relations.

(12) Importance of a specific plant or animal in the tribe's economy. Frequently, published papers merely state that a people utilized a certain organism, and such information is practically worthless. It is of the utmost importance to weigh the value of specific plants and animals in exact terms, if possible, otherwise relatively. The ideal would be to ascertain, for example, whether a given wild or cultivated plant constitutes 5, 30 or 70 per cent. of a tribe's total food supply.

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